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INVESTIGATION OF INITIAL STAGES OF OLIGOMERIZATION OF 3,4-(ETHYLENEDIOXY)THIOPHENE IN LOW-TEMPERATURE ORGANIC MATRICES BY MEANS OF PULSE RADIOLYSIS TECHNIQUE

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Poly(3,4-ethylenedioxythiophene) (PEDOT) was first synthesized in the second half of 1980's. It is one of the most successful conducting polymers because of excellent stability in highly conducting cationic, "doped" form. Different studies were carried out to elucidate the mechanism of oxidative polymerization of thiophenes and their analogues. This mechanism involves several steps such as electron transfer, carbon – carbon bond formation, deprotonation. Coupling of two cation radicals or two neutral radicals and the reaction of cation radical with its neutral parent molecule have been considered as the initial stages of such polymerization.

In this study the pulse radiolysis technique was employed for the observation of the initial stages of oligomerization of 3,4-ethylenedioxythiophene (EDOT) in low-temperature organic matrices. This methodology is suitable for generation and spectroscopic characterization of radical ions and for monitoring of their reactivity. The irradiation of glassy sample (cryogenic conditions) containing EDOT by high energy electron beam enables the observation of its cation radical under stable conditions. Upon annealing of the matrix consecutive steps of oligomerisation are observed. The detection of the transient species was done with UV-Vis-NIR spectroscopy. The products were also characterized by the time of flight secondary ion mass spectrometry (TOF-SIMS)